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ABSTRACT

This paper describes the ongoing project EONT--Experiment in Open and Distance Learning using New Technologies. The main objective of the project is to examine whether ODL using new technologies is effective. EONT will achieve its goals through experimentation, using an ODL environment based on some of the available new technologies (i.e., computer networks and networked hypermedia systems), one subject matter area, and real learners. Two distance learning universities and five conventional universities from seven European countries will take part in the project. Topics discussed include: (1) the SOCRATES Programme, the European Community action program for cooperation in the field of education; (2) objectives of the EONT project and features and uses of the EONT learning environment; and (3) the implementation approach, including courseware development. Figures present a schematic view of the EONT learning environment, components of the learning environment, methodology components for courseware development, the courseware development model, and a table of courses to be offered. A table showing the structure of the EONT consortium is appended. (Author/DLS)

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An Ongoing Experiment in ODL Using New Technologies

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Abstract: In this paper we present the ongoing project *EONT* - An *E*xperiment in *O*pen and Distance Learning (ODL) using *N*ew *T*echnologies. This project is partly funded by the European Union, within the framework of the SOCRATES programme, and its main objective is to provide an answer to the question whether ODL using new technologies is effective. EONT will achieve its goals through experimentation. We will use an ODL environment based on some of the available new technologies (namely computer networks and networked hypermedia systems), one subject matter area and real learners. Two Distance Learning universities and five conventional universities from seven European countries will take part in this project.

1. Introduction

Contemporary educational systems are criticized as having many drawbacks. Especially conventional universities, as the institutions of tertiary education, have been denounced for the constraints they impose on student selection as well as on the time and place of instruction delivery. *Open and Distance Learning* (ODL), as an instruction delivery method, has been proposed as a means of overcoming constraints and thus contributing in the improvement of education offered by these institutions. As a result, Open universities, Distance Learning universities and Dual-Mode universities have formed and have been in operation for quite a time, alongside with the conventional universities. However, irrespective of their type, the universities' problems have not been resolved up to now, at least not to the degree it was desired.

With the development of new information technologies, especially computer networks and networked hypermedia systems, it seems that time has come for ODL to become more effective. Indeed, the prospects are very good. Various media, like text, sound, still and moving images, etc., can be used in an integrated learning environment alongside with efficient, synchronous and asynchronous communication mechanisms. These technologies can be used in various ways. Although some attempts have started, no results are available as yet proving the effectiveness of ODL using the new technologies. Experimentation is needed to give an answer to this very important question. A project titled "*An experiment in ODL using the new technologies (EONT)*" intends to tackle this problem. This project has been set up and is currently running within the European Union "*SOCRATES Programme*" for Education.

In this paper, an overview of the project EONT is given with particular emphasis on its objectives and method of implementation. No evaluation results are presented since no such results are available as yet. The paper is structured as follows: In [The SOCRATES Programme] we give a brief description of the

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SOCRATES programme. In [The Project EONT] we present the project EONT and highlight its tight connection to computer networks and in particular to the Internet. In [Implementation Approach] we describe the approach being adopted for the implementation of EONT. Finally, in [Concluding Remarks], we discuss some issues concerning the project EONT and its expected results.

2. The SOCRATES Programme

SOCRATES [Commission 1995a, Commission 1995b] is the European Community action programme for cooperation in the field of education. Adopted on March 14, 1995 and spanning the period until the end of 1999, it is applicable to the 15 Member States of the European Union as well as to Iceland, Liechtenstein and Norway, in the framework of the European Economic Area agreement. SOCRATES is to be seen in the broader context of promoting lifelong learning in response to the challenge of addressing the constant educational needs resulting from technological change, quickening obsolescence of knowledge, and the role of education in enabling people to fulfill their individual potential. Education and training are of central importance to Europe's economic and social future. In the increasingly competitive and global marketplace, high quality human resources and the effective production, transfer and sharing of information are of paramount importance.

The overall aim of SOCRATES is to help improve the quality and relevance of education for children, young people and adults, by enhancing European cooperation and increasing access to a range of learning opportunities available across the Union. It seeks to provide learners of all ages and social groups with insights into the European dimension of the subjects which they are studying, to increase opportunities for personal experience of other European countries, to develop a stronger sense of sharing a European identity and to foster the ability to shape and adapt to changes in the economic and social environment. Among the eight actions of SOCRATES, one is devoted to ODL. The development of ODL is a key factor enabling citizens of the European Union to create and take advantage of an open area for educational cooperation in Europe. It is also one of the six areas for community action identified by the Maastricht Treaty as being of particular importance for improving the quality of education. The SOCRATES measures, focusing specifically on the support of ODL, are designed to contribute to:

- *Objective A*: facilitating cooperation between organizations and institutions in the field of ODL;
- *Objective B*: enhancing the skills of teachers, trainers and managers in the use of ODL techniques;
- *Objective C*: improving the quality and user-friendliness of ODL products; and
- *Objective D*: encouraging the recognition of qualifications obtained through ODL.

Concerning ODL, the emphasis within SOCRATES is essentially on stimulating European cooperation in:

- the use of distance learning as a means of overcoming barriers to physical mobility; and
- the use of information and communication technology for improving the quality of conventional education.

ODL involves the use of new methods -technical and/or non-technical- to improve the flexibility of learning in terms of space, time, choice of content or teaching resources and/or to improve access to educational systems from a distance. Promoting ODL can refer to:

- improving the quality of the organizational environment in which this form of education takes place; and
- improving the availability and quality of the teaching media and resources for this type of learning.

SOCRATES supports two types of projects in ODL: partnership projects and observatory projects. The purpose of the former, is to reduce fragmentation, to avoid duplication of effort, to improve working methods through exchanging experience and methodologies, and in general to achieve greater synergy at European level by working together on joint transnational projects. The purpose of the latter is to produce a comprehensive picture of the state of development, concerning a particular aspect of ODL or

the use of new educational technologies across a broad cross-section of the countries participating in SOCRATES.

3. The Project EONT

EONT (URL: http://hyperg.softlab.ntua.gr/EONT/) is a partnership project between seven universities from seven European Union countries, as depicted in [Appendix A]. Two of these universities are Distance Learning, whereas the rest are conventional. The partnership was formed on the basis of the partners' common interest in experimenting with ODL using the new technologies. The main objective of the project is to *make an experiment* in ODL using the new information and communication technologies, namely computer networks and networked hypermedia systems, in order to explore the effectiveness of such an approach. Other objectives are:

- to exchange information and experience concerning the use of the new information technologies in ODL;
- to stimulate the use of ODL in conventional as well as Distance Learning universities;
- to contribute in the development of the European dimension in education;
- to explore the possibility of using ODL as a means of providing learners in one country with access opportunities to education institutions in another country;
- to identify issues in using the new technologies in ODL; and
- to suggest ways of resolving these issues.

The new technologies can be used in various ways for the implementation of learning environments in ODL. One such learning environment [Koutoumanos et al., 1996] is abstracted in [Fig. 1] and [Fig. 2]. This learning environment will be used in the project. There are many subject matter areas in which one could experiment. Since all partners specialize in the area of Informatics, it was decided that EONT will be confined in this area. The partners are aware of the absence of any universally accepted standards for measuring effectiveness in education. This makes it very difficult to definitively substantiate claims about outcomes. Despite this fact, they decided to proceed, on the grounds that it deserves the effort.

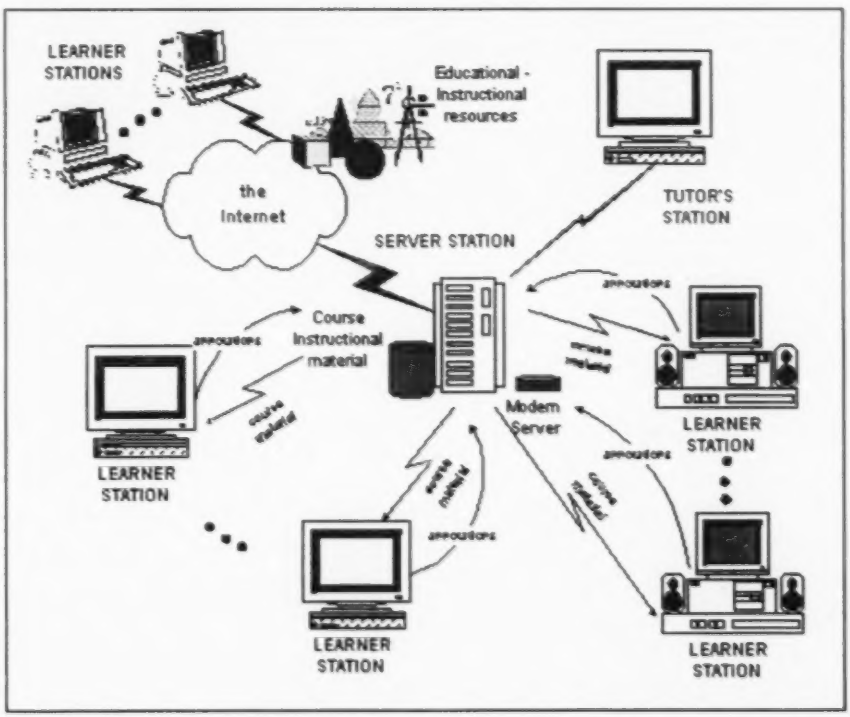

Figure 1: Schematic view of the learning environment to be used in the experiment.

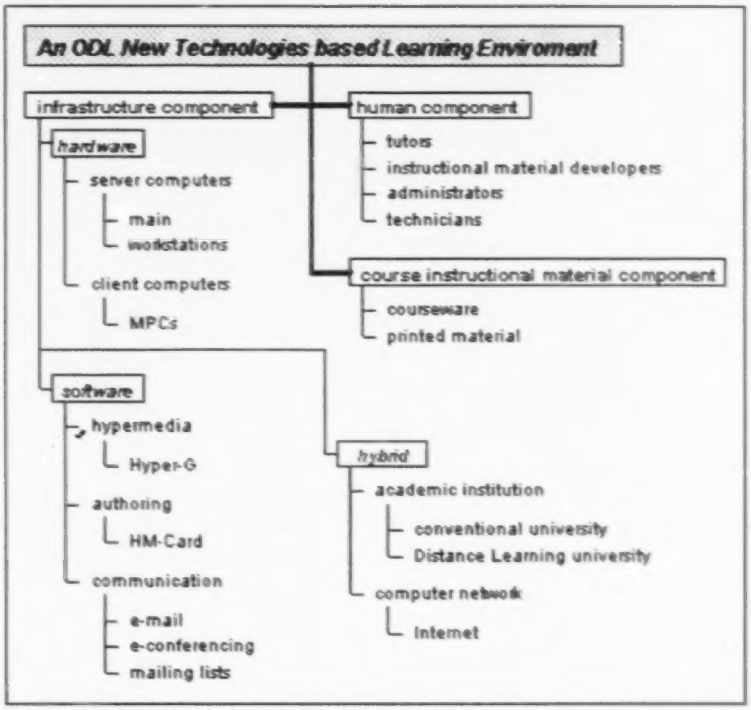

Figure 2: Components of the learning environment to be used in EONT.

The abstraction depicted in [Fig. 1] constrains the learning environment of EONT to a networked environment, in which the instructional material is stored in a server computer. The learners access it through client multimedia computers, connected to the server via a computer network. The abstraction depicted in [Fig. 2] specifies the components of this learning environment. The hypermedia system HYPER-G [Flohr 1995, Maurer 1996] and the authoring tool HM-Card [Maurer et al. 1995] will be provided to the consortium by the Austrian partner who has developed them. Both possess innovative features, among which one should mention:

- powerful structuring mechanisms;
- access control and user identification;
- private and public annotations;
- sophisticated search mechanisms;
- multilinguality;
- interoperability with major systems on the Internet, including WWW [Berners-Lee et al. 1994, Vetter et al. 1994], Gopher, WAIS, telnet and ftp;
- client-server architecture, distributed over a computer network;
- accessibility from a variety of platforms (UNIX, X-Windows, DOS, MS Windows, Macintosh, etc.);
- hyperlinks not stored within documents but in a separate *link database*, allowing users to attach links to read-only documents that they do not own;
- the courseware can be easily extended and updated;

For the purpose of the experiment, it was decided that the learning environment will be used:

- as an alternative instruction delivery environment, for the distance learning universities; and
- as a supplementary instruction delivery environment, for the conventional universities.

Each partner will offer one course. These courses are shown in [Tab. 1]. The language of each course

will be the native language of the associated partner. Thus, the courseware will initially be in the native language of the partners, i.e. the national version. Subsequently, it will be translated into English, in order to have an international version for each course.

Partner	Course content	Language
P1	Introduction to Software Engineering	Greek (GR)
P2	Hypermedia Systems	German (DE)
P3	User Interface Design and Development	English (EN)
P4	Multimedia	Dutch (NL)
P5	Introduction to the Unix Operating System	Norwegian (NO)
P6	Elementary Course in Mathematics	French (FR)
P7	Software Engineering for Distributed Systems	German (DE)

Table 1: Courses to be offered.

4. Implementation Approach

The project started on December 1st, 1995, and will be completed in three years. The experiment will be performed in all seven universities. The learning environment will be the same for all partners except for the course instructional material. This will be developed by each university, as explained previously, in two versions -a national and an international one- and will consist of courseware and printed material. The national version will be offered once during the second year of the project and once during the third year. The international version will be offered only once, during the third year, and will be used for experimenting with the use of ODL as a means of providing learners in one partner's country with access opportunities to the course instructional material of the other partners. Data will be collected through questionnaires completed by the learners, from the respective live tutor, as well from the learning system itself. The obtained data will be analyzed separately for each partner and then collectively for all partners. From this analysis, a results report will be produced.

The course instructional material will be developed during the first year of the project and will be used for experimentation during the last two years. Care will be taken for developing courseware of high quality, since bad quality courseware would invalidate the experiment. An engineering approach will be employed for this purpose. A common methodology has been adopted by the partners, a sketch of which is abstracted in [Fig. 3]. It is based on a courseware development model and has as components: development methods, management methods, standards and tools. The *courseware development model*, depicted in [Fig. 4], will be a variant of the waterfall model [Marshall et al. 1995]. The figure indicates the main development subprocesses and the order in which these will be carried out. *Development methods* give answers to questions such as how the development will be carried out, as well as how to observe the proper incorporation of didactic and pedagogical principles in the courseware. *Management methods* provide solutions to managerial problems that will arise. *Tools* are used for supporting the development process. Finally, *standards* provide solutions to recurring problems.

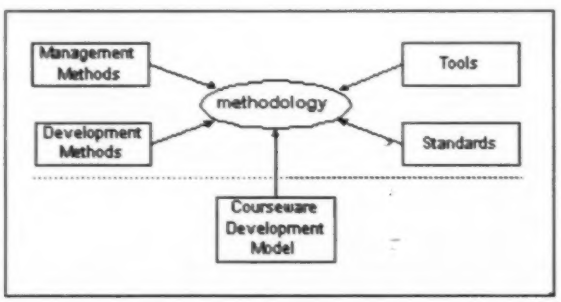

Figure 3: Methodology components for courseware development.

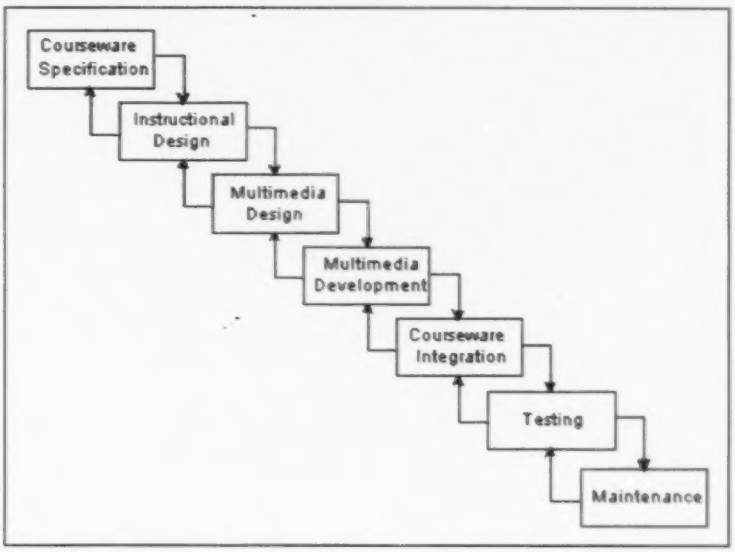

Figure 4: The courseware development model.

5. Concluding Remarks

The world of tomorrow will be digital. Information will be produced, stored and transmitted in digital form. Many tasks that are still performed manually will be performed automatically or semi-automatically. Automation will be the characteristic of tomorrow's information society. The new information technologies, especially computer networks and networked hypermedia systems, will play an important role in this evolution. It is certain that education will not be unaffected by this evolution. Many tasks that teachers perform today will be automated tomorrow and, as the automation of information processes has been very successful during the last decades, one can only expect that the same will happen with the automation of teaching processes.

ODL is expected to benefit the most from the evolution of new technologies. Although this sounds reasonable, it has to be proven by experimentation. This is the main objective of the EONT project, which addresses one particular ODL learning environment and one subject matter area. The findings of EONT have to be complemented with findings from other similar projects which will address different subject matter areas and possibly different ODL learning environments. Only through such a procedure can a reliable answer be found, concerning the problem of the effectiveness of ODL supported with new information technologies. Such a procedure is lengthy and expensive but the quality of education deserves all the effort and the associated cost.

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Appendix A: Structure of the Consortium

Partner	Institution	Country	Administrative person	Technical person
P1	Institute of Communication and Computer Systems (ICCS)	Greece	E. Skordalakis	A. Koutoumanos
P2	Institute for Information and Computer Supported Media (IICM)	Austria	H. Maurer	N. Scherbakov
P3	Katholieke Universiteit Leuven (KUL)	Belgium	H. Claes	E. Duval
P4	Open University (OU)	Gr. Britain	N. Wagstaff	D. Benyon
P5	Stord/Haugesund College (SHC)	Norway	H. Haugen	A. Staupe
P6	Université Lille I (UL)	France	A. Derycke	C. Vieville
P7	Fern Universität Hagen (FUH)	Germany	R. Bartz	B. Krämer